

from the SMBIOS database, and based on its enumerated value, displays the text associated with the value as stored in the template file.

Similar to enumerated values, the SMBIOS database may also include groups of bits that collectively represent some setting of the computing system. As with
5 enumerated values, the template file includes a descriptor key
GROUPED_BIT_FIELD_ID having different text to be printed based on the settings of the grouped bits.

As mentioned, the template file of the present invention includes a descriptor key for describing a bit field, (i.e., BIT_FIELD_ID). In some instances, not all of the bits in
10 an N bit field will be defined. For example, if the bit field includes 64 bits, a smaller number of these bits may be defined, while others are reserved. In this instance, so that the utility program does not needlessly process these undefined bits and the template file is not required to store information for undefined bits, the template file includes a
15 descriptor key END_OF_BIT_FIELD indicating to the utility program the last defined bit position in the bit field.

In a similar manner, an enumerated value having N possible values may have less than all N possible values defined. In this instance, the template file again includes a
20 descriptor key END_OF_ENUM_ID indicating to the utility program a last defined data value, such that the template file does not include and the utility does not search for undefined values in the template file.

As mentioned, the template file may include data in the form of groups of bits that collectively define a data value, (GROUPED_BIT_FIELD_ID). For example, in a grouped bit field with M total bits a group of N bits may define 2^N values because each bit can be set to either a 1 or a 0. The number of bits in the group N may be less than or
25 equal to the total number of bits allocated (M) to the grouped bit field, and if less, other groups may be defined until all bits are used. In some embodiments, the group of bits may not have defined values for all 2^N possible values. In this instance, the template file may further include a data descriptor key referred to as GBF_END_GROUP indicating to the utility program a last defined value for the group of bits such that the utility does not
30 search for undefined bit field group values.

In some instances, the grouped bit field data may not define all of the bits. In this instance, the template file further includes a GBF_END_GROUP descriptor key. This descriptor key indicates the end of the definitions for all bit groups within the grouped bit field data.

5 In addition to descriptor keys for defining the data structures stored in the SMBIOS database, the template file of the present invention also includes structure definitions that define the structure of the template file itself. Specifically, for each data structure in the SMBIOS database, there is a corresponding structure definition in the template file that includes descriptor keys for defining the structure and text and format
10 information related to the structure of the SMBIOS database. These structure definitions are interpreted by the utility program, which may use process control keys to properly read the data from the template file. For example, one process control key, (i.e., STRUCTURE_HEADER_ID), is used to indicate to the utility program the beginning of a SMBIOS structure definition in the template file and a second process control key is
15 used to indicate the end of the template file, (i.e., END_OF_STRUCTURES). The STRUCTURE_HEADER_ID control key is used at the beginning of the definitions of each SMBIOS structure Type. Importantly, data following the STRUCTURE_HEADER_ID key may include control flags indicating which fields of the information stored for the Type is editable by the user, allowing the user to edit some
20 of this information.

In some instances, one or more of the Fields in the structure definition may be repeated. Control keys SET_REPEAT_START_ID and SET_REPEAT_END_ID respectively mark the beginning and ending locations of repeated fields. In addition, the template file includes control keys SET_REPEAT_COUNT_ID and
25 SET_REPEAT_SIZE_ID to respectively determine the number of times a group of fields in a structure definition is repeated and the size of the repeated area in bytes.

As mentioned the SMBIOS database typically includes a large amount of data concerning the computing system. For example, currently SMBIOS includes Types 00-127, which concern various hardware and software components of the system. In some
30 instances, however, an original equipment manufacture OEM may wish to include information concerning specific additional features of their computing systems. To this

end, the present invention provides an OEM template file that includes information for interpreting and displaying the additional OEM specific data structures stored in the SMBIOS database with Types greater than or equal to 128. The information stored in the OEM template file uses the same descriptor and control keys used in the main template file discussed above.

BRIEF DESCRIPTION OF THE DRAWINGS

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

Figure 1 is an operational block diagram illustrating the use of the template file by a utility program to interpret and display data retrieved from a SMBIOS database, according to one embodiment of the present invention.

Figure 2 is an operational block diagram illustrating the steps performed by the utility program using the template file to interpret and display data retrieved from a SMBIOS database, according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

As discussed above and provided in more detail below, the present invention provides apparatus and methods for managing the display of data stored in data structures in a SMBIOS database. The apparatus and methods of the present invention provide a template file intermediate between the utility program and database of SMBIOS information. The template file includes all information required for interpreting and displaying the data structures stored in the SMBIOS database. In this regard, when the utility is commanded to retrieve and display data from the SMBIOS database, it retrieves